

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. An imaging system having spatial resolution enhancement comprising:

means for providing multispectral bands of images;
a computer connected to said multispectral bands of images for receiving said multispectral bands of images;
means within said computer for resampling-up said multispectral bands of spectral;
means for storing said resampled-up multispectral bands of images; and
means for performing multispectral band-to-band pixel registration of said resampled-up images.

2. The imaging system as recited in Claim 1 wherein said computer comprises a memory for storing said resampled-up, registered images.

3. The imaging system of Claim 1 wherein said means for producing multispectral bands of images comprises a plurality of cameras.

4. The imaging system of Claim 3 wherein each of said plurality of cameras comprises an interline transfer, black and white, progressive scan, CCD video cameras.

5 5. The imaging system as recited in Claim 3 wherein each of said plurality of cameras comprises 782 x 576 square pixels.

6. The imaging system as recited in Claim 3 wherein said plurality of cameras are optically aligned with a fractional pixel offset to each other.

7. The imaging system as recited in Claim 3 wherein each of said plurality of cameras comprises a narrow band interference filter in front of the lens of each of said plurality of cameras.

15 8. The imaging system as recited in Claim 7 wherein said narrow band interference filter in front of each of said plurality of cameras comprises user selectable spectral bands within a spectral range covering blue, green, red and near infrared.

9. The imaging system as recited in Claim 1 wherein said means for resampling-up said multispectral bands of images

comprises a routine for performing a neighbor average interpolation.

5 10. The imaging system as recited in Claim 1 wherein said computer comprises means for acquiring a bracket of computer controlled multiple exposures of said multispectral bands of images for extending dynamic range.

11. An imaging system having spatial resolution enhancement comprising:

a sensor head including a plurality of cameras, each of said cameras having an interchangeable filter producing multispectral bands of images;

a computer for receiving said multispectral bands of images from said plurality of cameras;

15 said computer comprises means for resampling-up said multispectral bands of images; and

means for performing multispectral band-to-band pixel registration of said resampled-up images.

20 12. The imaging system as recited in Claim 11 wherein said computer comprises means for storing said resampled-up, registered images.

13. The imaging system as recited in Claim 11 wherein said cameras are optically aligned with a fractional pixel offset to each other.

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14. The imaging system as recited in Claim 11 wherein said means for resampling-up said multispectral bands of images comprises a routine for performing a neighbor average interpolation.

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15. The imaging system as recited in Claim 11 wherein said sensor head comprises progressive scan, interline transfer, CCD video cameras.

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16. The imaging system as recited in Claim 11 wherein each of said plurality of cameras comprises 782 x 576 square pixels.

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17. The imaging system as recited in Claim 11 wherein said narrow band interference filter in front of the lens of each of said cameras comprises user selectable spectral bands within a spectral range for blue, green, red, and near infrared.

18. The imaging system as recited in Claim 11 wherein said means for resampling-up said multispectral bands of images comprises a routine for performing a neighbor average interpolation.

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19. The imaging system as recited in Claim 11 wherein said computer comprises means for acquiring a bracket of computer controlled multiple exposures of said multispectral bands of images for extending dynamic range.

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20. A method of providing an imaging system with spatial resolution enhancement comprising the steps of:

providing means for generating multispectral bands of images;

digitizing said multispectral bands of images;

15 performing a resampling-up operation on said multispectral bands of images in a computer connected to said means for generating multispectral bands of images; and

performing band-to-band pixel registration of said bands of images.

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21. The method as recited in Claim 20 wherein the method comprises the step of storing said resampled-up, registered images.

22. The method as recited in Claim 20 wherein said step of generating multispectral bands of images comprises the step of using a plurality of interline transfer, black and white, progressive scan, CCD video cameras.

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23. The method as recited in Claim 22 wherein said step of using a plurality of cameras comprises the step of optically aligning said cameras with a fractional pixel offset to each other.

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24. The method as recited in Claim 22 wherein said step of using a plurality of cameras comprises the step of providing each of said cameras with a narrow band interference filter in front of the lens of each of said cameras.

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25. The method as recited in Claim 24 wherein said step of providing each of said cameras with a narrow band interference filter comprises the step of said narrow band interference filter having user selectable spectral bands within a spectral range covering blue, green, red and near infrared.

26. The method as recited in Claim 22 wherein said step of using a plurality of video cameras comprises the step of

providing each of said plurality of cameras with 782 x 576 square pixels.

5 27. The method as recited in Claim 20 wherein said step of performing a resampling-up operation on said multispectral bands of images comprises the step of performing a neighbor average interpolation routine.

10 28. The method as recited in Claim 20 wherein said step of performing said resampling-up operation comprises the steps of:

15 redistributing the sensed data of each of said bands of images by filling odd columns with existing data and even rows/columns with zeros;

20 calculating an average value of the pixel data at every two adjacent odd columns;

25 copying said average value into an even column between said adjacent odd columns;

30 redistributing the sensed data of each of said bands of images by filling odd rows with existing pixel data and even rows with zeros;

35 calculating an average value of the pixel data at every two adjacent rows; and

copying said average value into an even row between said adjacent odd rows.

29. The method as recited in Claim 20 wherein said step of performing band-to-band pixel registration of said bands of images comprises the step of cropping edges of the bands to produce a 1532 x 1150 x 4 bands format.

30. The method as recited in Claim 20 wherein said method comprises the step of acquiring a bracket of computer controlled multiple exposures of said multispectral bands of images for extending dynamic range.

31. A method of providing an imaging system with spatial resolution enhancement comprising the steps of:

providing a sensor head including a plurality of cameras, each of said cameras having a narrow band interference filter producing multispectral bands of images;

digitizing said multispectral bands of images from said plurality of cameras;

storing said digitized multispectral bands of images;

performing a resampling-up operation on said bands of images; and

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performing band-to-band pixel registrations of said bands of images.

32. The method as recited in Claim 31 wherein said method comprises the step of storing said resampled-up, registered images in a memory.

33. The method as recited in Claim 31 wherein said method comprises the step of said cameras being optically aligned with a fractional pixel offset to each other.

34. The method as recited in Claim 31 wherein said step of performing said resampling-up operation on said bands of images comprises the step of performing a neighbor average interpolation.

35. The method as recited in Claim 31 wherein said step of providing a sensor head including a plurality of cameras comprises the step of providing progressive scan, interline transfer, CCD video cameras.

36. The method as recited in Claim 31 wherein said step of providing a sensor head including a plurality of cameras each of said cameras having a narrow band interference filter

comprises the step of said narrow band interference filter having user selectable spectral bands within a spectral range covering blue, green, red and near infrared.

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37. The method as recited in Claim 31 wherein said step of providing a sensor head including a plurality of cameras comprises the step of providing each of said plurality of cameras with 782 x 576 square pixels.

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38. The method as recited in Claim 31 wherein said step of performing band-to-band pixel registration of said bands of images comprises the step of cropping edges of the bands to produce a 1532 x 1150 x 4 bands format.

39. The method as recited in Claim 31 wherein said step of performing said resampling-up operation comprises the steps of:

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redistributing the sensed data of each of said bands of images by filling odd columns with existing data and even rows/columns with zeros;

calculating an average value of the pixel data at every two adjacent odd columns;

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copying said average value into an even column between said adjacent odd columns;

redistributing the sensed data of each of said bands of images by filling odd rows with existing pixel data and even rows with zeros;

5 calculating an average value of the pixel data at every two adjacent rows; and

copying said average value into an even row between said adjacent odd rows.

40. The method as recited in Claim 31 wherein said method comprises the step of acquiring a bracket of computer controlled, multiple exposures of said multispectral bands of images for extending dynamic range.